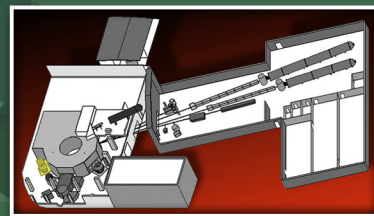


INSTRUMENT

HB-1A

BEAM LINE

HIGH FLUX ISOTOPE REACTOR



FIXED-INCIDENT-ENERGY TRIPLE-AXIS SPECTROMETER

The Fixed-Incident-Energy (14.6 meV) Triple-Axis Spectrometer uses a double pyrolytic graphite monochromator system. The first monochromator is vertically focused, and the second can be either a vertically or doubly focused unit. Two highly oriented pyrolytic graphic filters (HOPG), one after each monochromator, are used to reduce $\lambda/2$ contamination. These filters, together with the double monochromator system, provide HB-1A with an exceptionally clean beam in terms of higher-order contamination neutrons: $I_{\lambda/2} \approx 10^{-4} \times I_{\lambda}$. This spectrometer also has one of the most intense beams at this

energy at the HFIR, as well as a very low γ and fast neutron background. Typical energy resolution is ~ 1 meV, but, using the beryllium analyzer, the energy resolution width can be reduced to ~ 0.5 meV.

HB-1A development and operation is a collaborative effort of the Oak Ridge National Laboratory and Ames Laboratory neutron scattering groups.

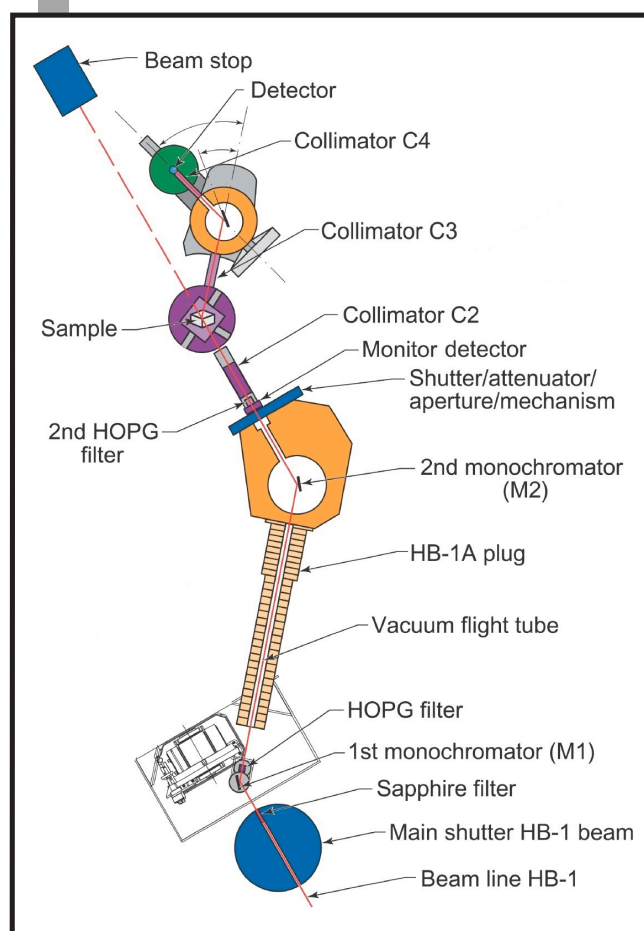
APPLICATIONS

- Excitation spectra to ~ 35 meV using neutron energy gain and low-lying excitations, 1–9 meV, using neutron energy loss
- Elastic studies on crystallographic and magnetic structures and transitions in a Q range of 0.2 to 4.9 \AA^{-1}
- Elastic studies and excitations in thin films and other small-volume samples where high flux and very low higher-order contamination of the beam are critical

SPECIFICATIONS

Beam spectrum	Thermal
Monochromator	PG(002) double crystal
Monochromator takeoff angle	$2\theta_M = 41.3^\circ$ E, $= 14.7$ meV
Analyzers	PG(002), Be(101), Be(002), Si(111), Ge(111)
Sample angle	0° to 360°
Scattering angle	-5° to 135°
Analyzer angles	-60° to 120°
Collimations (FWHM)	Premonochromator: 48' Monochromator-sample: 10', 20', 30', 40' Sample-analyzer: 10', 20', 30', 40' Analyzer-detector: 70', 140'
Beam size	40×150 mm max
Filters	Sapphire premonochromator 2 HOPG; after M1 and M2
Flux at sample	$\sim 2 \times 10^7$ n/cm ² /s (est.)
Momentum range	0.2 to 4.9 \AA^{-1} (elastic configuration)
Energy transfer	~ 35 meV to ~ 11 meV at $q = 3 \text{ \AA}^{-1}$

Status: Operational



Recent experiments on this instrument include measurement of phonon dispersion curves in martensitic, shape-memory, and magnetostrictive alloys; crystallographic and magnetic structure determinations in giant magnetocaloric, magnetoresistive, and intermetallic alloys; magnetic structures and spin-density waves in thin films; magnetism in low-dimensional systems; and spin waves and magnetic structures in magnetoelectric materials.

FOR MORE INFORMATION, CONTACT

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<http://neutrons.ornl.gov/instruments/HFIR/HB1A/>



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